

**What Is Claimed Is:**

1. An optical disc recording method, comprising:  
repeatedly performing a test record a plurality  
of times, prior to an actual record on an optical disc,  
in an outer peripheral test area of the optical disc  
which is on an outer peripheral side with respect to  
a program area of the optical disc, wherein the test  
record includes:

controlling a velocity to a predetermined  
linear velocity, and

sequentially changing a recording power;  
obtaining an appropriate recording power value  
at the linear velocity, on the basis of reproduced  
signals of the plural test records in the outer  
peripheral test area; and

performing an actual record on the optical disc  
while controlling the recording power to the  
appropriate recording power value at the predetermined  
linear velocity, or to an appropriate recording power  
value which is obtained on the basis of the appropriate  
recording power value at another linear velocity.

2. The optical disc recording method of claim 1,  
further comprising:

on the basis of reproduced signals of the plural  
test records in the outer peripheral test area,  
obtaining a recording power value for each of the test

6 records, wherein a predetermined parameter relating  
7 to a reproduced signal quality has an appropriate value  
8 at the recording power value; and

9 on the basis of recording power values which  
10 are obtained respectively for the test records,  
11 obtaining the appropriate recording power value at  
12 the predetermined linear velocity.

1 3. The optical disc recording method of claim 2,  
2 further comprising:

3 eliminating an outlier value in the recording  
4 power values respectively obtained for the plural test  
5 records in the outer peripheral test area;

6 obtaining an average value of remaining recording  
7 power values; and

8 obtaining the average value as the appropriate  
9 recording power value at the predetermined linear  
10 velocity.

1 4. The optical disc recording method of claim 2,  
2 further comprising:

3 obtaining a minimum value of the recording power  
4 values respectively obtained for the plural test  
5 records in the outer peripheral test area; and

6 obtaining the minimum value as the appropriate  
7 recording power value at the predetermined linear  
8 velocity.

5. The optical disc recording method of claim 1, wherein the plural test records in the outer peripheral test area are respectively performed in areas which are sequentially shifted in a circumferential direction of the optical disc.

6. The optical disc recording method of claim 2, wherein the plural test records in the outer peripheral test area are respectively performed in areas which are sequentially shifted in a circumferential direction of the optical disc.

7. The optical disc recording method of claim 3, wherein the plural test records in the outer peripheral test area are respectively performed in areas which are sequentially shifted in a circumferential direction of the optical disc.

8. The optical disc recording method of claim 4, wherein the plural test records in the outer peripheral test area are respectively performed in areas which are sequentially shifted in a circumferential direction of the optical disc.

9. The optical disc recording method of claim 1,  
wherein the outer peripheral test area is set in a

3 remaining area which is obtained by removing an area  
4 corresponding to a predetermined lead-out area from  
5 a portion which is on an outer peripheral side of an  
6 information area with starting from a maximum allowable  
7 outer peripheral position of the program area.

1 10. The optical disc recording method of claim 2,  
2 wherein the outer peripheral test area is set in a  
3 remaining area which is obtained by removing an area  
4 corresponding to a predetermined lead-out area from  
5 a portion which is on an outer peripheral side of an  
6 information area with starting from a maximum allowable  
7 outer peripheral position of the program area.

1 11. The optical disc recording method of claim 3,  
2 wherein the outer peripheral test area is set in a  
3 remaining area which is obtained by removing an area  
4 corresponding to a predetermined lead-out area from  
5 a portion which is on an outer peripheral side of an  
6 information area with starting from a maximum allowable  
7 outer peripheral position of the program area.

1 12. The optical disc recording method of claim 4,  
2 wherein the outer peripheral test area is set in a  
3 remaining area which is obtained by removing an area  
4 corresponding to a predetermined lead-out area from  
5 a portion which is on an outer peripheral side of an

6 information area with starting from a maximum allowable  
7 outer peripheral position of the program area.

1 13. The optical disc recording method of claim 5,  
2 wherein the outer peripheral test area is set in a  
3 remaining area which is obtained by removing an area  
4 corresponding to a predetermined lead-out area from  
5 a portion which is on an outer peripheral side of an  
6 information area with starting from a maximum allowable  
7 outer peripheral position of the program area.

1 14. An optical disc recording method in which an  
2 actual record is performed on an optical disc while,  
3 in an inner peripheral side of the optical disc with  
4 respect to an adequate radial position, a velocity  
5 is controlled by making a rotational velocity constant,  
6 and, in an outer peripheral side of the optical disc,  
7 the velocity is controlled by making a linear velocity  
8 constant at a final value of a linear velocity in the  
9 constant rotational velocity control, said method  
10 comprising:

11 performing a test record one time, prior to the  
12 actual record on the optical disc, in an inner peripheral  
13 test area of the optical disc which is on an inner  
14 peripheral side with respect to a program area of the  
15 optical disc, while controlling a velocity by making  
16 a linear velocity constant at an initial value of the

17 linear velocity in the constant rotational velocity  
18 control record and sequentially changing a recording  
19 power;

20 repeatedly performing the test record a plurality  
21 of times, in an outer peripheral test area which is  
22 on an outer peripheral side with respect to the program  
23 area of the optical disc, while controlling the velocity  
24 by making a linear velocity constant at a final value  
25 of a linear velocity in the constant rotational velocity  
26 control record and sequentially changing a recording  
27 power;

28 on the basis of a reproduced signal of the one  
29 test record in the inner peripheral test area, obtaining  
30 a recording power value at which a predetermined  
31 parameter relating to a reproduced signal quality has  
32 an appropriate value, so that the obtained value is  
33 set as a recording power value at the initial value  
34 of the linear velocity in the constant rotational  
35 velocity control record;

36 on the basis of reproduced signals of the plural  
37 test records in the outer peripheral test area,  
38 obtaining a recording power value at which the parameter  
39 has an appropriate value for each of the test records,  
40 and obtaining an appropriate recording power value  
41 on the basis of recording power values which are obtained  
42 respectively for the test records, so that the obtained  
43 value is set as a recording power value at the final

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44 value of the linear velocity in the constant rotational  
45 velocity control record and in the constant linear  
46 velocity control record;

47 in the area where the constant rotational velocity  
48 control record is performed when an actual record is  
49 performed on the optical disc, in accordance with the  
50 linear velocity at each position, interpolating the  
51 value which has been set as the recording power value  
52 at the initial value of the linear velocity and the  
53 value which has been set as the recording power value  
54 at the final value of the linear velocity, and  
55 controlling the recording power value to the  
56 interpolated value; and

57 in the area where the constant linear control  
58 record is performed when the actual record is performed  
59 on the optical disc, controlling the recording power  
60 value to the value which has been set as the recording  
61 power value in the constant linear velocity control  
62 record.

1 15. The optical disc recording method of claim 14,  
2 further comprising:

3 eliminating an outlier value in the recording  
4 power values respectively obtained for the plural test  
5 records in the outer peripheral test area;

6 obtaining an average value of remaining recording  
7 power values; and

8            setting the average value as the recording power  
9            value at the final value of the linear velocity in  
10           the constant rotational velocity control record, and  
11           in the constant linear velocity control record.

1           16. The optical disc recording method of claim 14,  
2           further comprising:

3                  obtaining a minimum value of the recording power  
4           values respectively obtained for the plural test  
5           records in the outer peripheral test area; and

6                  setting the minimum value as the recording power  
7           value at the final value of the linear velocity in  
8           the constant rotational velocity control record, and  
9           in the constant linear velocity control record.

1           17. The optical disc recording method of claim 14,  
2           wherein the plural test records in the outer peripheral  
3           test area are respectively performed in areas which  
4           are sequentially shifted in a circumferential direction  
5           of the optical disc.

1           18. The optical disc recording method of claim 15,  
2           wherein the plural test records in the outer peripheral  
3           test area are respectively performed in areas which  
4           are sequentially shifted in a circumferential direction  
5           of the optical disc.



1 19. The optical disc recording method of claim 16,  
2 wherein the plural test records in the outer peripheral  
3 test area are respectively performed in areas which  
4 are sequentially shifted in a circumferential direction  
5 of the optical disc.

1 20. The optical disc recording method of claim 14,  
2 wherein the outer peripheral test area is set in a  
3 remaining area which is obtained by removing an area  
4 corresponding to a predetermined lead-out area from  
5 a portion which is on an outer peripheral side of an  
6 information area with starting from a maximum allowable  
7 outer peripheral position of the program area.

1 21. The optical disc recording method of claim 15,  
2 wherein the outer peripheral test area is set in a  
3 remaining area which is obtained by removing an area  
4 corresponding to a predetermined lead-out area from  
5 a portion which is on an outer peripheral side of an  
6 information area with starting from a maximum allowable  
7 outer peripheral position of the program area.

1 22. The optical disc recording method of claim 16,  
2 wherein the outer peripheral test area is set in a  
3 remaining area which is obtained by removing an area  
4 corresponding to a predetermined lead-out area from  
5 a portion which is on an outer peripheral side of an

6 information area with starting from a maximum allowable  
7 outer peripheral position of the program area.

1 23. The optical disc recording method of claim 17,  
2 wherein the outer peripheral test area is set in a  
3 remaining area which is obtained by removing an area  
4 corresponding to a predetermined lead-out area from  
5 a portion which is on an outer peripheral side of an  
6 information area with starting from a maximum allowable  
7 outer peripheral position of the program area.

1 24. An optical disc recording device in which an  
2 actual record is performed on an optical disc while,  
3 in an inner peripheral side of the optical disc with  
4 respect to an adequate radial position, a velocity  
5 is controlled by making a rotational velocity constant,  
6 and, in an outer peripheral side of the optical disc,  
7 the velocity is controlled by making a linear velocity  
8 constant at a final value of a linear velocity in the  
9 constant rotational velocity control, said device  
10 comprising:

11 a disc servo circuit which rotates the optical  
12 disc;

13 an optical pickup which irradiates the optical  
14 disc with a light beam to perform record and reproduction  
15 operations on the optical disc;

16 an optical power controlling section which

controls a power of the light beam emitted from the optical pickup;

a signal quality detecting section which obtains a predetermined parameter relating to a reproduced signal quality on the basis of a reproduced signal detected by the optical pickup; and

a system controlling section, wherein, in the system controlling section,

prior to the actual record on the optical disc, in an inner peripheral test area which is on an inner peripheral side with respect to a program area of the optical disc, a test record is performed one time while a velocity is controlled by making a linear velocity constant at an initial value of the linear velocity in the constant rotational velocity control record and a recording power is sequentially changed, and, in an outer peripheral test area which is on an outer peripheral side with respect to the program area of the optical disc, the test record is repeatedly performed a plurality of times while the velocity is controlled by making a linear velocity constant at a final value of a linear velocity in the constant rotational velocity control record,

on the basis of a reproduced signal of the one test record in the inner peripheral test area, a recording power value at which a predetermined parameter relating to a reproduced signal quality has

44 an appropriate value is obtained, and the obtained  
45 value is set as a recording power value at the initial  
46 value of the linear velocity in the constant rotational  
47 velocity control record,

48 on the basis of reproduced signals of the plural  
49 test records in the outer peripheral test area, a  
50 recording power value at which the parameter has an  
51 appropriate value is obtained for each of the test  
52 records, and an appropriate recording power value is  
53 obtained on the basis of recording power values which  
54 are obtained respectively for the test records, and  
55 the obtained value is set as a recording power value  
56 at the final value of the linear velocity in the constant  
57 rotational velocity control record, and in the constant  
58 linear velocity control record, and

59 in an actual record on the optical disc, in the  
60 area where the constant rotational velocity control  
61 record is performed, the record is performed while,  
62 in accordance with the linear velocity at each position,  
63 interpolating the value which has been set as the  
64 recording power value at the initial value of the linear  
65 velocity, and the value which has been set as the  
66 recording power value at the final value of the linear  
67 velocity, and controlling the recording power value  
68 to the interpolated value, and, in the area where the  
69 constant linear control record is performed, the record  
70 is performed while controlling the recording power

71 value to the value which has been set as the recording  
72 power value in the constant linear velocity control  
73 record.

1 25. The optical disc recording device of claim 24,  
2 wherein the system controlling section eliminates an  
3 outlier value of the recording power values  
4 respectively obtained for the plural test records in  
5 the outer peripheral test area, obtains an average  
6 value of remaining recording power values, and sets  
7 the average value as the recording power value at the  
8 final value of the linear velocity in the constant  
9 rotational velocity control record, and in the constant  
10 linear velocity control record.

1 26. The optical disc recording device of claim 24,  
2 wherein the system controlling section obtains a  
3 minimum value of the recording power values  
4 respectively obtained in the plural test records in  
5 the outer peripheral test area, and sets the minimum  
6 value as the recording power value at the final value  
7 of the linear velocity in the constant rotational  
8 velocity control record, and in the constant linear  
9 velocity control record.

1 27. The optical disc recording device of claim 24,  
2 wherein the system controlling section respectively

3 performs the plural test records in the outer peripheral  
4 test area in areas which are sequentially shifted in  
5 a circumferential direction of the optical disc.

1 28. The optical disc recording device of claim 25,  
2 wherein the system controlling section respectively  
3 performs the plural test records in the outer peripheral  
4 test area in areas which are sequentially shifted in  
5 a circumferential direction of the optical disc.

1 29. The optical disc recording device of claim 26,  
2 wherein the system controlling section respectively  
3 performs the plural test records in the outer peripheral  
4 test area in areas which are sequentially shifted in  
5 a circumferential direction of the optical disc.

1 30. The optical disc recording device of claim 24,  
2 wherein the system controlling section sets the outer  
3 peripheral test area in a remaining area which is  
4 obtained by removing an area corresponding to a  
5 predetermined lead-out area from a portion which is  
6 on an outer peripheral side of an information area  
7 with starting from a maximum allowable outer peripheral  
8 position of the program area.

1 31. The optical disc recording device of claim 25,  
2 wherein the system controlling section sets the outer

3 peripheral test area in a remaining area which is  
4 obtained by removing an area corresponding to a  
5 predetermined lead-out area from a portion which is  
6 on an outer peripheral side of an information area  
7 with starting from a maximum allowable outer peripheral  
8 position of the program area.

1 32. The optical disc recording device of claim 26,  
2 wherein the system controlling section sets the outer  
3 peripheral test area in a remaining area which is  
4 obtained by removing an area corresponding to a  
5 predetermined lead-out area from a portion which is  
6 on an outer peripheral side of an information area  
7 with starting from a maximum allowable outer peripheral  
8 position of the program area.

1 33. The optical disc recording device of claim 27,  
2 wherein the system controlling section sets the outer  
3 peripheral test area in a remaining area which is  
4 obtained by removing an area corresponding to a  
5 predetermined lead-out area from a portion which is  
6 on an outer peripheral side of an information area  
7 with starting from a maximum allowable outer peripheral  
8 position of the program area.

1 34. An optical disc, comprising:  
2 an inner peripheral test area which is formed

3 in a portion on an inner peripheral side of the optical  
4 disc with respect to a program area; and  
5 an outer peripheral test area which is wider  
6 than the inner peripheral test area, and is formed  
7 in a portion on an outer peripheral side of the optical  
8 disc with respect to the program area.

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